Intelligent Data Processing in Creating Targeted Advertising

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For successful conduct and development of any business, many conditions must be met. One of the most important conditions affecting business is the proper conduct of advertising campaigns. Advertising campaign – is a deliberate system of planned promotional activities, united by one idea and concept in order to achieve the specific marketing goals within an advertiser‘s coherent marketing strategy [1].

The greatest effect from advertising is achieved when it is shown to the interested audience, i.e. to those people who can purchase the advertised product or service. To do this, the advertiser compiles a list of requirements that potential customers must meet. This method of compiling and maintaining an advertising campaign is effective and economically advantageous and is called targeted advertising. Thus, targeted advertising – are advertisements about the provided services or goods that are demonstrated only to the target audience.

There are several ways to distribute targeted advertising: the first is the advertising in social networks, the second is the mass mailing distribution of advertising messages. The first method is effective because every sixth user of the Internet has an account in a social network. But each click on the advertisement by the usual Internet user is chargeable for the advertiser. As a result advertising in social networks involves large financial investments, so in this work it is proposed to consider the second way of advertising messages in more details.

Targeted advertising assume the delivery of advertising messages only to those customers who are potentially interesting in that, so there is a need to make a decision whether or not an advertisement will be sent to a particular client. This process is the separation of client database into two segments: the first – is the target group of customers, and the second – is that part of the customers, who are unlikely will be interested in the advertised object. This formulation of the problem relates to the problem of binary classification.

Formally the problem of classification of customers can be presented in the following way. Let K – is a set of clients of the organization under consideration, where $K = \{k_1,\ldots,k_m\}$ and m – is a number of clients in the database of the considered company. We introduce Y – that is a set of groups or classes of clients. The existing entire client database should be split into such classes, i.e. $Y = \{y_1, y_2\}$. Then it is necessary to find an algorithm or mapping of one set to another, when each element of the first set put into correspondence with a particular element of the second set: $a: K \to Y$.

Consider the solution of the problem of binary classification in the context of the client database of "Atlant Shina" company, which sells automobile tires and related

products, and is also the truck tire market leader. Advertised objects have various aspects, as well as the clients have their own preferences, so at first it is necessary to make a list of input variables, based on which the decision about object demonstration to the target customers will be taken. It is proposed to use the following inputs: the characteristics of the advertised product, for example, tire dimensions, load capacity for which tires are designed; client preferences; client shopping list; number of client cars.

For intelligent processing of such information, various data processing algorithms can be applied. But due to the fact that the data have different nature, and the company "Atlant Shina" has a lot of experience in doing business and it stores sales statistics for many years, it is proposed to use the artificial neural networks, which work well with various kinds of problems [2, 3].

The first step in using neural networks for solving the classification problem is the development of a network architecture. In this work, the architecture of an artificial neural network has been developed and investigated using MATLAB software package. Further stages of the neural network approach for finding solution of the classification problem are:

- preparation of data for network training;
- training the network;
- testing the network;
- network modeling (use the network for solving the problem).

The preparation of input data is the normalization of data for the leveling of emissions or abnormal data. To solve the problem of classification of clients three-layered feed-forward neural network of perceptron type was developed:

- input layer includes five neurons such as the number of input parameters (tire dimensions; load capacity for which tires are designed; client preferences; client shopping list; number of client cars);
- hidden layer consists of seven neurons;
- output layer contains two neurons – as the number of customer groups (one group is to be sent the advertising message, and the second one is not to be sent the advertising message);
- as the activation function the sigmoid function is proposed to be used;
- as the learning algorithm of the neural network with considered topology it is suitable to use the backpropagation algorithm.

Thus the current work proposes the solution of classification problem of customers for the company that sells tires and related products, in order to be used in targeted advertising campaigns. Artificial neural networks were considered as the mathematical apparatus for solving the considered problem.

References

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